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PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re

INVENTOR: Francisco Juarez ) EXAMINER: Michael G. Miller

)

SERIAL NO.: 10/821,092 ) ART UNIT: 1709

)

FILING DATE: April 8, 2004 ) DATE: April 23, 2009

)

FOR: METHOD AND APPARATUS FOR MODULATION OF PRECURSOR  
EXPOSURE DURING A PULSED DEPOSITION PROCESS

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**REPLY BRIEF**

This is a reply to the Examiner's Answer mailed April 15, 2009. Please charge any over or under payment for this reply brief to the undersigned's Deposit Account No. 04-0566.

**A. Claims 1, 3-7, 20, 23 and 25**

The Examiner has stated that "[Santiago] '287 teaches a means of controlling pressure by raising and lowering the pedestal." Answer, p.7. Appellants disagree, and submit that there is no such pressure control means taught by Santiago '287 or inherent

therein. First, Santiago '287 never mentions any control of "pressure" of anything, let alone chamber pressure. Second, Santiago discloses that process gases are removed from the processing volume 120 above the upper surface of the support assembly 138 through either flow control orifice 182 (Figs. 1 and 2), orifice 306 and holes 308 (Fig. 3) or holes 406 (Fig. 4) to the pumping channel 170 of evacuating pumping system 64, below the upper surface of the support assembly. The proper pressure control of the process gas is never described in connection with any up or down movement of the support assembly.

On page 7 of the Answer, the Examiner further takes the position that "in the geometry of [Santiago] '287 as discussed above, the only way to remove the unreacted first reactive gas from the chambers is to lower the pedestal to connect the space above the support (first chamber volume) with the space below the support (the sum thereof being the second chamber volume)." (Emphasis added.) This is manifestly untrue, since Santiago '287 discloses in Figs. 1 and 2 support assembly 138 in the upper position, and the flow of gas from processing volume 120 above the upper surface of the support assembly through flow control orifice 182 to the pumping channel 170 of evacuating pumping system 64, below the upper surface of the support assembly. Likewise, Figs. 3 and 4 show orifices 306, 308 and 406 by which gas flows from the volume above the support assembly to the pumping channel below. These clearly demonstrate the flow of process gas out of the volume in process space 120 while the support assembly remains in its upper position. It is therefore incorrect to assert that the "only way" to remove reactive gas is to lower the pedestal.

Later, the Examiner again takes the position that "[Santiago] '287 teaches enlarging the chamber volume to provide access to the vacuum pump." Answer, p.7. This is also incorrect for the reasons given above, namely, that orifices 182, 306, 308 and 406 permit gas to flow from the volume above the support assembly to the pumping channel below, without any lowering of the support assembly.

It is sheer conjecture that Santiago '287 inherently performs or teaches any change in chamber volume while the reaction of a precursor is still depositing a layer on a substrate. This argument is undermined by Santiago '287's own teaching at column 5, lines 37-40, in connection with Fig. 4, that "lip 410 allows purged gases to sweep the surface of the seal 402 facing the process region 186 so that process and other gases are not trapped on the substrate side of the seal 402." This indicates that removal of any precursor by purging is performed while the support assembly remains in its raised position, since there would be no possibility that any gases would be "trapped on the substrate side of the seal 402" once the support assembly was moved to the lowered position. Thus, the Examiner's hypothesis of Santiago '287 is unsupported.

Regardless of the ideal gas law, appellants' novel and unobvious process to employ a change in volume to reduce concentration of and remove undeposited precursor to end the reaction thereof is nowhere disclosed or suggested by the Examiner's unsupported belief as to the teachings of Santiago '287 and Luo '535.

**B. Claims 2, 8-10, 21, 22, 24 and 26**

The Examiner has argued the rejection of these claims on the same basis as that described for claims 1, 3-7, 20, 23 and 25, and the arguments fail for the same reasons as given above.

**C. Claims 27 and 28**

The Examiner now cites claim 10 and Fig. 4 of Santiago '287, but only for the teaching "a configuration wherein the support assembly overlaps the flange that forms the upper part of the sidewalls. Answer, p.8. However that may be, claim 10 and Fig. 4 of Santiago '287 do not disclose or suggest appellants' claimed "chamfered corners on lower ends of the side walls" and "pedestal [having] chamfered edges that correspond with the chamfered corners on the lower ends of ... side walls." The Examiner also continues to cite column 4, lines 21-29 and Figs. 1 and 2, both of which have been addressed and dismissed in appellants' main brief.

Respectfully submitted,



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